Converting to MARINES

Thinking about changing your freshwater tank to a saltwater system? It may not be necessary to buy a complete marine set-up from scratch. So what equipment will need replacing and what can you keep?

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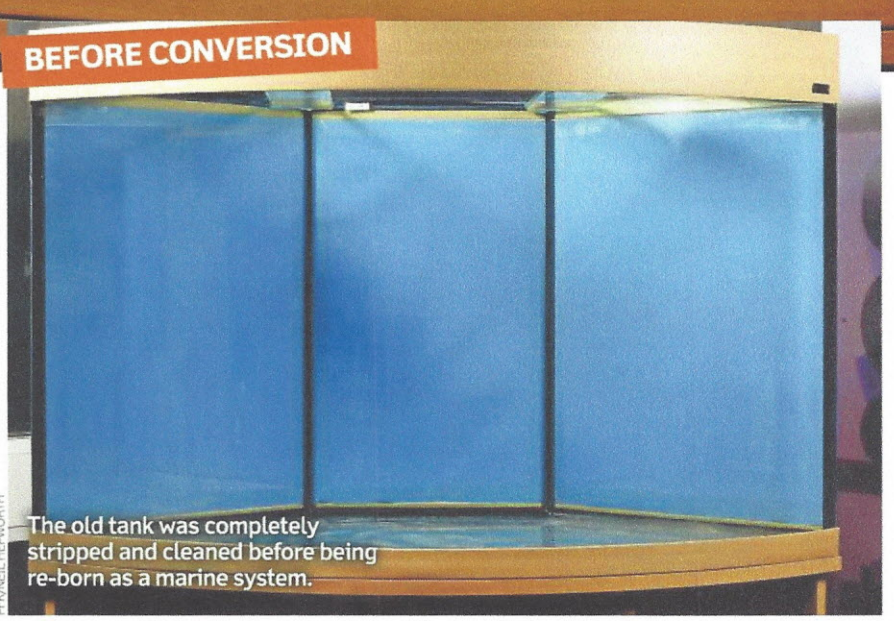
This reef system uses the Fluval tank, cabinet and some of the kit from the original freshwater set-up.

If you already have a freshwater aquarium, but fancy trying your hand at saltwater, you may be wondering whether to convert your existing set-up to marine. It's a common question and in fact it can be surprisingly easy to establish a successful salty system in this way.

What are you going to keep?

Firstly, it's worth planning out the type of system you'd like to achieve, along with a wish list of potential livestock. There are three main approaches to consider:

Fish-only: As the name suggests, this type of system centres purely on marine fish, with no invertebrate stock. This is a classic set-up for fish such as morays, large lionfish, large puffers and aggressive triggers, but smaller, peaceful species can also obviously be maintained in this way. Biological filtration tends to be based on traditional methods widely used in freshwater fishkeeping (such as canister or trickle filters). This represents the most straightforward system for conversion from an existing freshwater aquarium, with minimal additional equipment (notably a protein skimmer) often being necessary.



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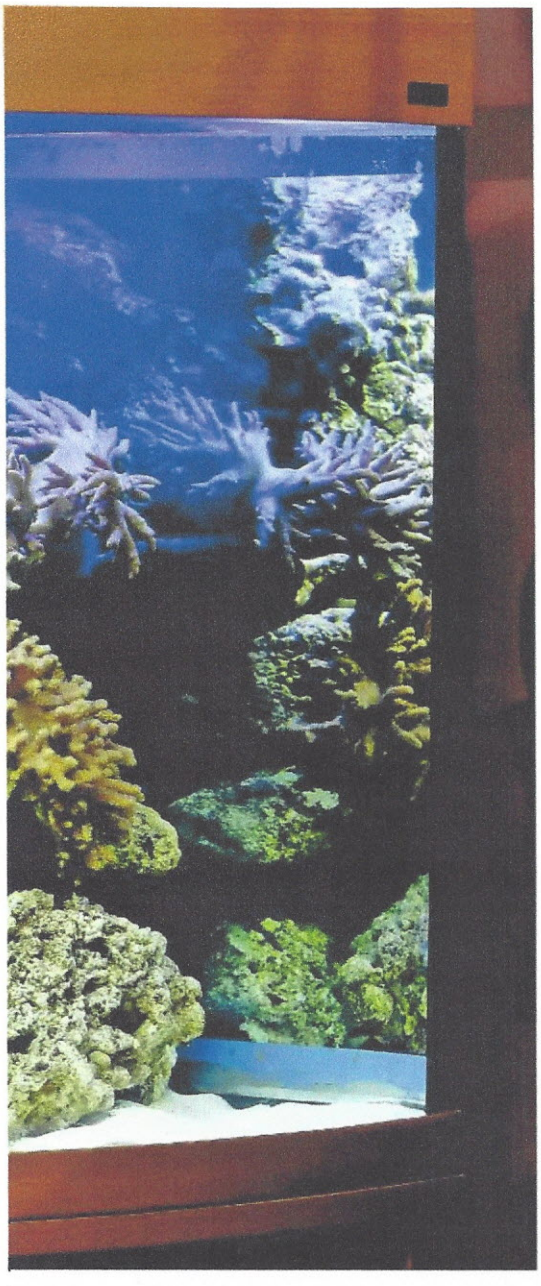
The old tank was completely stripped and cleaned before being re-born as a marine system.

Fish only with live rock (FOWLR): This system also houses fish, but employs live rock to fulfil either part, or all, of the required biological filtration. Far from being a 'poor man's reef', this is an ideal set-up for fish which would otherwise munch coral, such as many angels and butterflies, but the sky's the limit as far as the fish you could keep. Again, this can be a fairly simple conversion project, and FOWLR systems can be run with just a little additional equipment. Think of this system as an intermediate approach between the fish-only and reef tank.

Reef: A reef system houses invertebrates (including corals), usually along with fish. Although live rock and sand are exclusively used for the bulk of biological filtration,



these systems are the most demanding in terms of water quality, lighting and water movement, and there may be significant additional equipment needed. Even so, it's perfectly possible to run a full mixed reef partly using the components of a freshwater system; some substantial pimping will be necessary, but it can be done.

It's possible for the system to evolve over time, so it's worth considering this when planning. For example, a system could be initially set up as a FOWLR aquarium, and as experience and funds permit, it could be developed into a complete reef, with livestock and equipment added gradually.

How important is live rock?

Live rock comprises chunks of coral rubble, naturally broken from the reef, which has been colonised with a range of life forms. This includes bacteria responsible for nitrification and denitrification as well as protozoans, crustaceans, worms, algae, and a host of other organisms which collectively cycle and process waste. Properly cycled or 'cured' live rock (where die-off during shipping has been managed by the dealer) is expensive, but it's an important component of the FOWLR and reef aquarium. If sufficient live rock is available and bioloading isn't excessive, live rock can fulfil all the biological filtration needs of the aquarium, and using additional filtration can simply lead to issues with nitrates. A reef system will ideally have 1kg of live rock per 10 l/2.2 gal aquarium volume — so for a 250 l/55 gal aquarium, reckon on 25kg of live rock.

Re-using the tank

As long as it's watertight, pretty much any glass or acrylic tank will be suitable for a marine conversion, so that's potentially a big chunk of the budget accounted for. Some tanks feature aluminium trims, and these could be a possible worry. However, if they are not subject to any significant corrosion, these trims are unlikely to add significant amounts of metal to the water. The tank will need a thorough stripdown and clean before setting up. Using a non-abrasive pad, scrub the panes with white vinegar to remove any limescale build-up and rinse well in clean water.

What about a sump?

If your freshwater system already has a sump, you're onto a winner, and you can install all your equipment there with no problem. If not, consider whether to retrofit a sump. Sumps aren't essential for a marine aquarium, but they increase system volume (always a bonus) as well as adding extra flexibility, allowing for unsightly equipment to be safely stashed out of sight, improving the aesthetics of the system and facilitating easier maintenance. The more complicated the system's technical requirements, the more a sump will prove necessary to prevent the tank itself becoming cluttered — but a fish-only or FOWLR tank can easily be set up without a sump.

There are two ways to incorporate a sump:

Drilling the tank to include an overflow or weir. This takes a certain amount of skill and patience, and is best left to a professional — your local aquatic shop may be able to help. Drilled tanks offer the safest and most reliable way of sending the aquarium's water down to a sump.

Alternatively, an overflow box can be employed. These use a syphon to draw

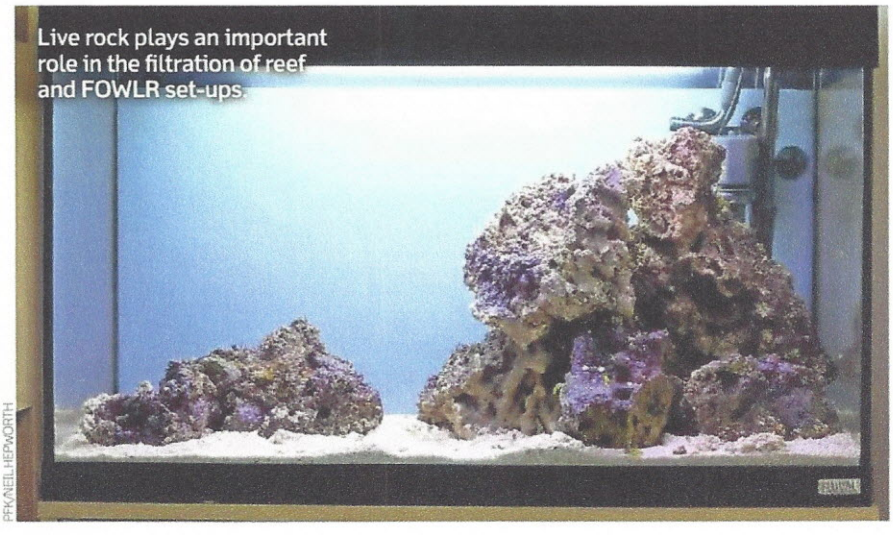
TROPICAL MARINE CENTRE

Don't skimp on the skimmer!

A key item of equipment for the marine aquarium that isn't found on freshwater systems is the protein skimmer, and for the best chance of success, you'll want one regardless of the system. A decent skimmer represents a considerable outlay of cash, but it's one of the best investments you can make. Don't skimp on the skimmer, and research the available range of models thoroughly.

There's a skimmer to suit most marine conversions, with sump-based, 'hang-on' and internal models being available. If possible, opt for an oversized skimmer for maximum efficiency.

Protein skimmers directly remove dissolved organic compounds (DOCs) and suspended particles, which lead to poor water quality, by passing aquarium water into a reaction chamber into which a mist of fine bubbles is introduced. Parts of these organic molecules are hydrophobic ('water hating'), and they become attracted to the air bubble. As the bubbles rise in the reaction chamber, the organics form a foam which is pushed up and out of the skimmer into a collection cup, whereby they are exported from the system.



Live rock plays an important role in the filtration of reef and FOWLR set-ups

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water from the main aquarium to the sump. Set up and maintained correctly, overflow boxes can work well (providing the syphon doesn't break), and this method allows for a sump to be installed without drilling the tank.

Cover glasses and hood

The trend in marine aquariums has been very much towards open-topped tanks. However, there's no reason why a hood from an existing freshwater system can't be used (especially if this incorporates the lighting tubes; but it's important that the hood is sufficiently ventilated to ensure adequate gas exchange).

Cover glasses can hamper gas exchange, so these could be left out, although they can be used if fish prone to jumping are kept (such as eels, various wrasses and firefish) — but you'll still need to ensure adequate ventilation to achieve saturated, oxygen-rich water.

What about the filter?

A fish-only system can utilise the same basic filtration as a freshwater set-up. An internal power filter or external canister can be used, and can fulfil the roles of mechanical, biological and chemical filtration essentially in exactly the same way (although the bacteria responsible for biological filtration are completely different between freshwater and marine systems, so the biological media will need to be matured from scratch). Set up this way, fish-only systems have limited denitrification, so nitrates can build up, which will need to be remedied with water changes.

FOWLR aquariums may augment the biological filtration with a canister or trickle filter, but this is only necessary if bioloading from the fish exceeds the live rock's filtration capacity (for example if large, messy angels are kept). Many FOWLR tanks simply use live rock to perform all the biological filtration (which can achieve natural denitrification, helping to keep nitrate levels low), but it's still possible to put a canister or power filter to good use here. Load it with filter floss or foam and activated carbon, and that's mechanical and chemical filtration sorted, plus some additional flow.

The reef system exclusively uses live rock for biological filtration, and additional biological filtration isn't used, as it can contribute to elevated nitrate and phosphate levels, which are bad news for corals. As with the FOWLR set-up, a canister can still be utilised for mechanical and chemical filtration on a reef, however.

Sumps aren't essential but are very useful for tucking away all that unsightly equipment.

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Water movement

With the exception of, say, very fast-flowing river biotopes, marine systems generally need more water movement than their freshwater counterparts (for a reef, you're looking at a minimum of 10x turnover per hour, although 40x plus is now common for many reefs). This is to assist with biological filtration (especially if live rock is used), to prevent detritus settling in dead spots, ensure adequate oxygenation, and to assist sessile animals with feeding and ridding themselves of waste, so it's likely you'll need to up the ante here. You can still use pumps from a freshwater set-up, but double-check parts such as impeller shafts are safe for use in saltwater. Ceramic and stainless steel are fine, but any pump with brass parts is a definite no-no (this is a source of copper contamination, which is lethal to invertebrates). Brass tends only to be used in pond pumps, but it's worth checking any equipment before use.

Additional pumps such as powerheads will almost certainly be necessary, especially for reef systems that demand strong water movement. Some pumps allow for wave effects to be created, and these will benefit all marine systems, from fish-only to reef.

Heating and cooling

Heater/thermostats for use in freshwater should be perfectly suited for use in saltwater, so there's no need to change these. Do bear in mind that reef systems in particular are sensitive to increased temperature — temperatures nudging 30°C/86°F stress corals and clams, causing them to shed their algal symbionts (zooxanthellae) in a process known as 'bleaching'. Therefore, if you're going to be keeping invertebrates, it may be necessary to consider chilling the aquarium in summer, either through the use of fans (use those specifically designed for aquarium use) or by employing a refrigerant-based aquarium chiller with a titanium heat exchanger.

Lighting it up

The aquarium's existing lighting is likely to be geared towards maintaining plant growth (freshwater lighting tends towards a 'daylight' colour temperature of 5000–6000K (K=Kelvin) which is towards the yellow end of the visible spectrum). Many marine aquariums will need more intense lighting, so depending on the requirements of the marine set-up, the lighting may need to be altered, augmented or swapped entirely.

However, marine fish-only tanks can technically be run using fluorescents suitable for freshwater systems and such set-ups don't demand high light intensity. Even so, many folks will opt to change tubes to a colour temperature of 10,000K or higher, which offers a bluer colour and a more 'marine' aesthetic. Additionally, increasing the number of tubes to encourage growth of the live rock's coralline algae will benefit FOWLR systems.

For a reef containing corals and other light-demanding animals, a couple of T8 tubes just won't cut the mustard. You'll need high output T5s, LEDs or metal halides (or a combination of these) with a colour temperature of 10000–14000K, and additional blue actinic lighting will make the colours of corals pop.

Avoid using tapwater

You'll still need to perform water changes. Regardless of the type of marine system, reverse osmosis (RO) water is best for salt mixes and topping off evaporation (and it's pretty much essential for reef systems), so you'll either need to buy an RO unit if you don't already have one, or buy RO from your dealer. Tapwater can contain nitrates and phosphate which you don't want in your salt mix, not to mention heavy metals and pesticides.

Substrates and hardscape

Ensure all hardscape materials are suitable for saltwater — live rock is a key feature of reef and FOWLR tanks, but fish-only aquariums can use other materials, including dense ocean rock, lighter tufa (although this can act as a nitrate and phosphate 'sponge') and even imitation resin rocks. Whichever material is used, make sure it's not going to leach metals or other nasties into the water.

Suitable substrates range from fine aragonite sand, through coral sand or gravel to coarse rubble chunks. The choice of substrate will largely be dictated by the needs of the animals — many wrasse need a fine substrate for digging and sleeping, for example, whereas burrowing shrimp can benefit from a mixture of particle sizes.